ISD proposals - rtEFIT, Long pulse DND, and High performance DND

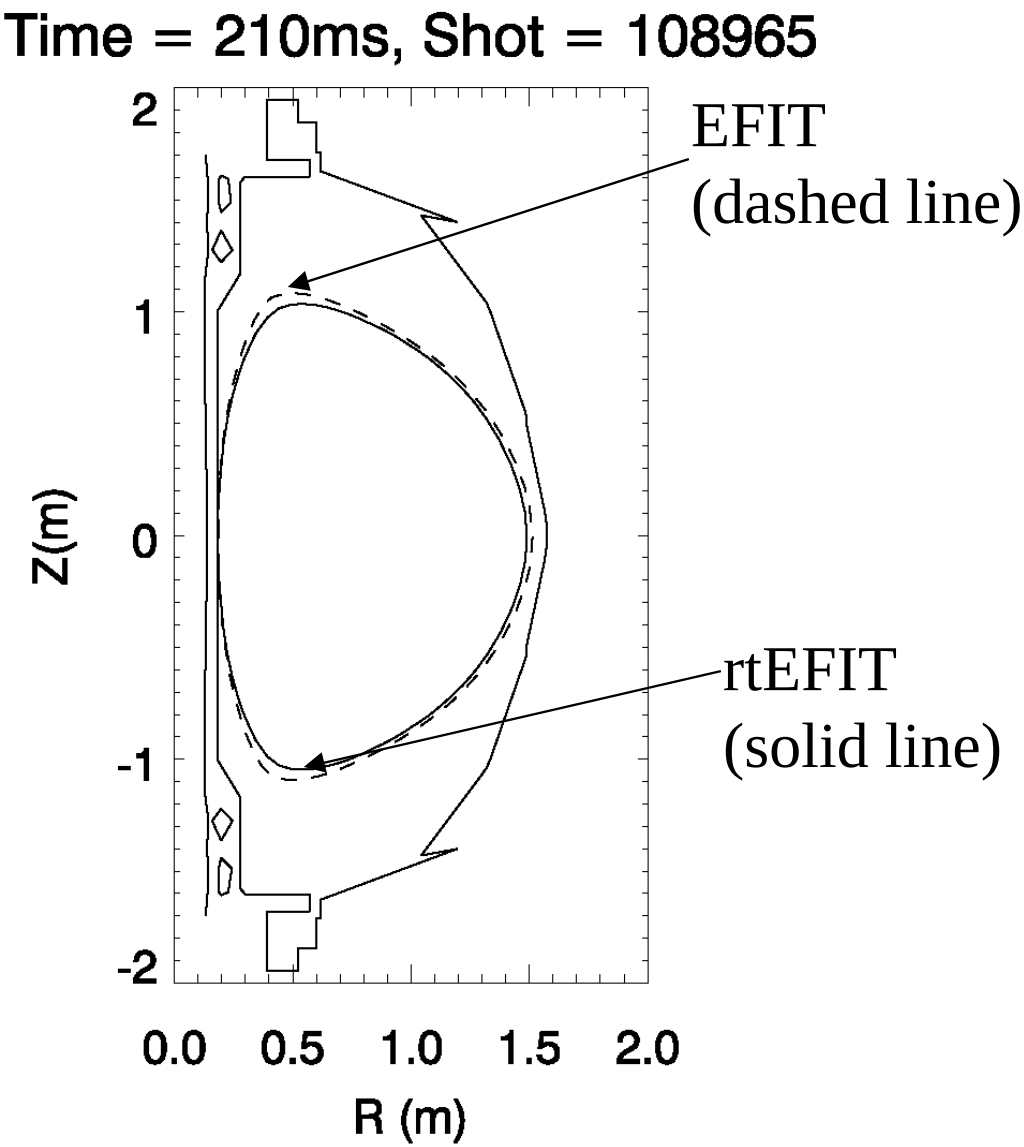
D. Gates

NSTX Results review

9/11/02

rtEFIT reconstructions accurate

- Use same vessel model as offline EFIT
- Errors due to bad real time data channels
  - 4 adjacent Mirnovs (worst case)

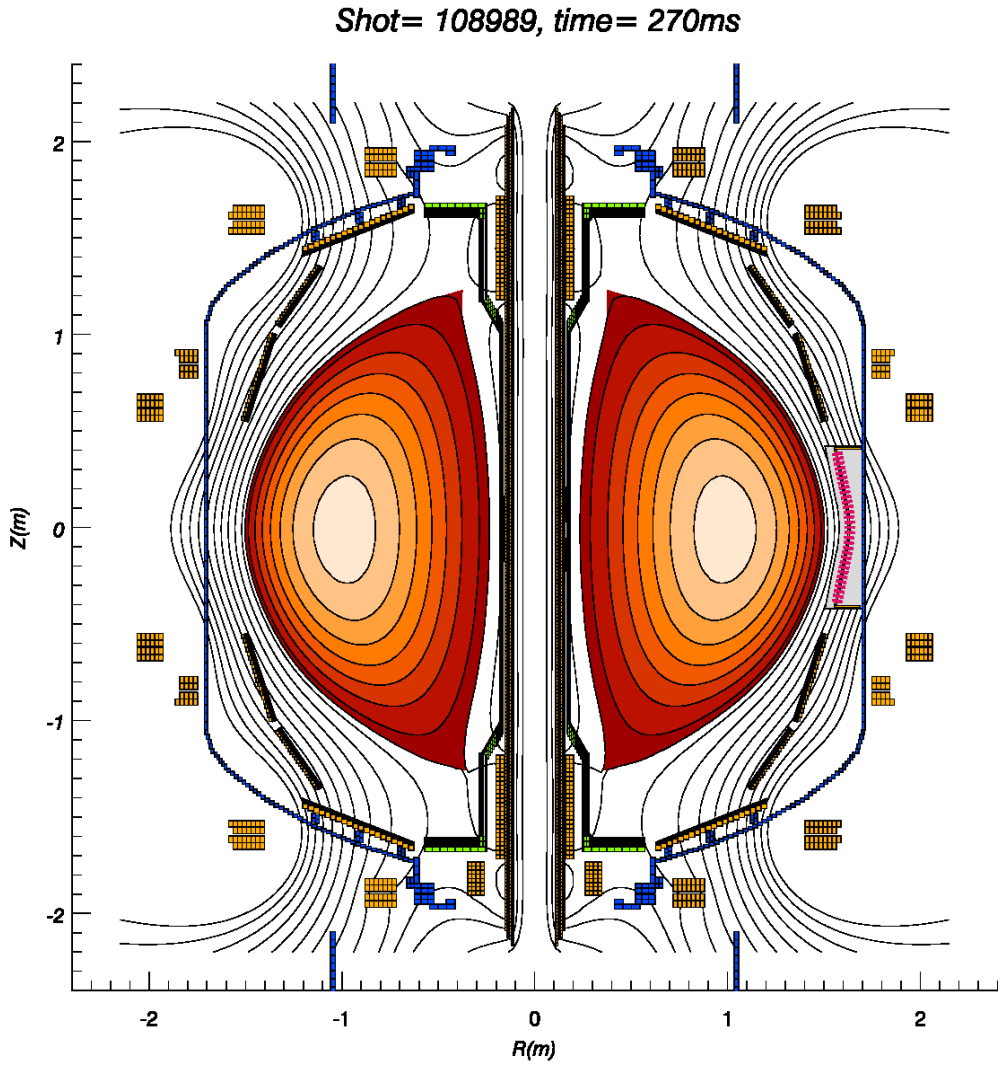


rtEFIT needs (XMP 24)

- Create scenarios for inner wall limited, LSn and DND plasmas
- Make rtEFIT/isoflux a useful tool
  - Train operators
  - Convince session leaders to switch
- Requires ~6 dedicated run days (2 days per scenario). Can be done early in the run.

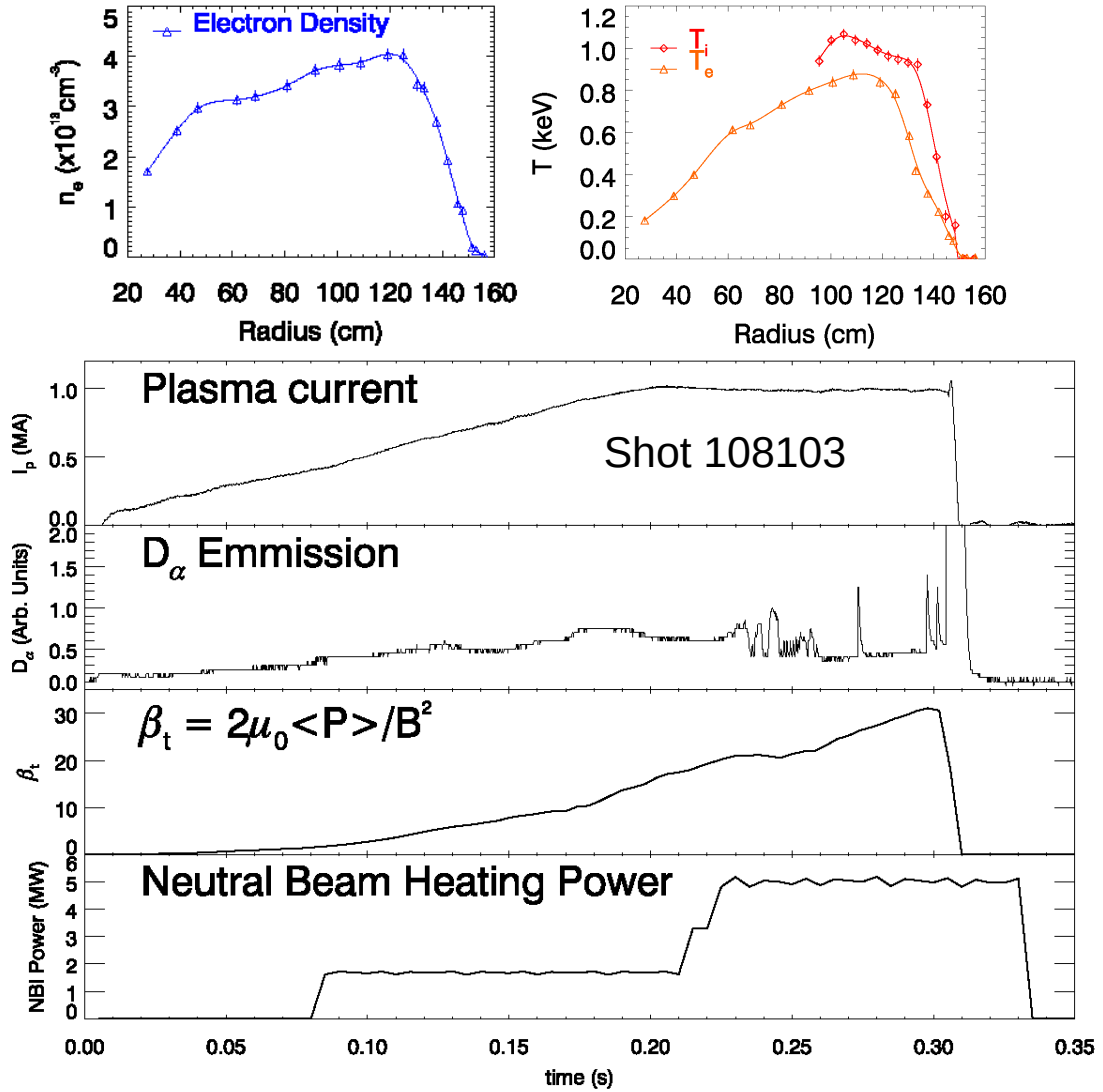
Strong shaping key to high β

- High triangularity and elongation raises edge q for fixed current, toroidal field
  - *Effect stronger at low A*
  - $A \sim 1.4$
  - $\kappa \sim 2.0$
  - $\delta \sim 0.8$
- Can reach higher I/aB
- Also allows more rapid I_p ramp



β_t = 34% achieved on NSTX

- β_t ($=2\mu_0<P>/B_t^2$) of 34% achieved in high triangularity double null H-mode discharge
- $\beta_N \sim 6.3$
- $l_i \sim 0.8$
- I_p = 1MA
- B_t = 0.3T
- P_{NBI} = 5MW

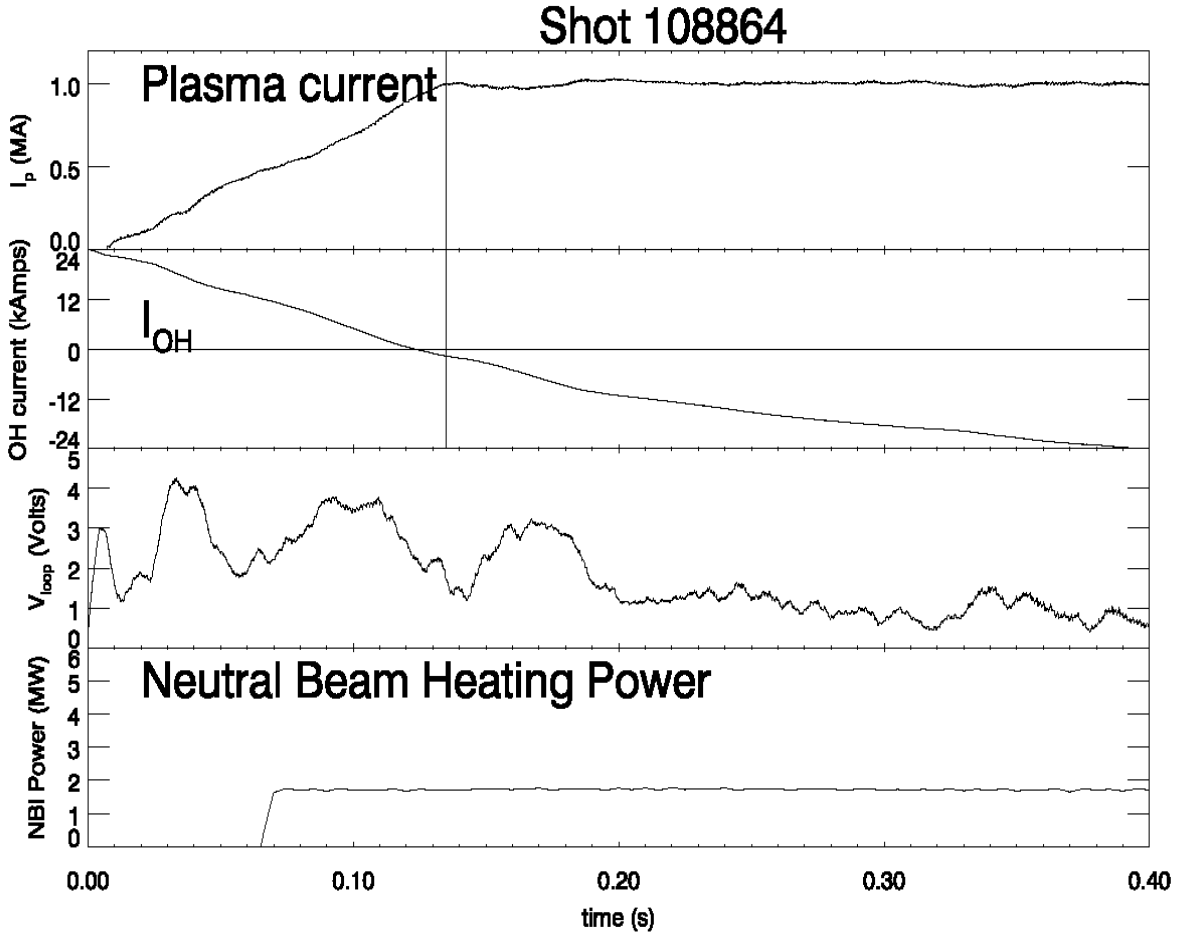


XP 220 needs

- Every time we tried this things got better
  - Particularly the high β shots $\Rightarrow$ 40% ?
  - Need a high β shot with good kinetics
- We should try it again (2 run days)

XP-228 Long pulse, high I_p, high δ

- Successfully made a 1MA plasma with half swing OH,
  - early κ ramp
  - δ high early
- Never heated the plasma (very technical day)
  - Never got the beam timing right
  - Concept has potential for long pulse at high current - 1MA



XP-228 needs

- Approved XP needs more run time
  - 2-3 days

Summary

- All old XP/XMPs already approved
- Need more run time
- rtEFIT will be a useful tool this year!